Environmental CLEANUP

Jet Propulsion Laboratory Information Sheet *August 1996*

GROUND-WATER WELLS

Study of the water and soil beneath the surface is nearly always required as part of the remedial investigation/feasibility study phase of a Superfund cleanup project. Therefore, in many cases, some sort of drilling into the soil or bedrock is needed.

Subsurface INVESTIGATION

Drilling might be done for several reasons. It is often the only way to take samples of the subsurface, which can be analyzed for contamination in a laboratory. Or, it might be required to construct wells that allow continuous sampling of the air and water found in the subsurface.

This information sheet describes how water wells are constructed, or "completed," after drilling, and discusses some of the special features of the ground-water monitoring wells installed as part of the JPL Superfund Project. The purpose of these monitoring wells is to assess the nature and extent of ground-water contamination and provide data that will help in designing a process for controlling and cleaning up any contamination.

Wells for obtaining ground water from subsurface aquifers can be of many different types, ranging from small, hand-dug pits to large, deeply drilled, casing-lined wells used for city water supplies.

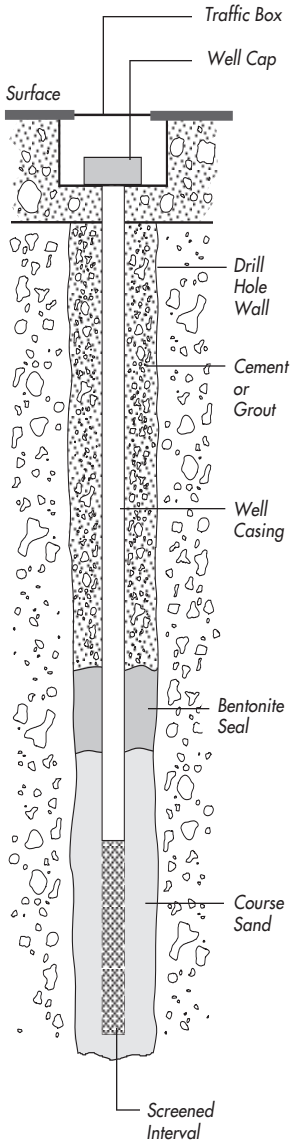
Water Well CONSTRUCTION

The wells installed for the JPL project are generally between a few hundred and a thousand feet deep, and from four to six inches in diameter when completed.

Most modern ground-water wells are constructed in a manner similar to the well shown in the illustration at left. After the hole is drilled, a casing with a diameter several inches smaller than the drill hole is lowered down. The casing is usually made of either polyvinyl chloride (PVC) or steel pipe segments, which are fitted tightly together or welded into a single piece as they are lowered.

Ground Water Well

The JPL ground-water sampling wells are between a few hundred and a thousand feet deep.



Obviously, the ground water needs a way to get into the well casing, so there is usually a screened interval at the bottom of the well. These well screens are often made of wire-wrapped stainless steel or perforated PVC pipe.

As the well is constructed, coarse sand is placed around and slightly above the screened interval to allow ground water to flow freely into the well screen. Bentonite is placed on top of the sand to isolate the screened interval from the rest of the drill hole. Bentonite is a naturally occurring clay mineral that expands when wet. As the bentonite is put into place, water is added, creating an impermeable seal above the sand.

The remainder of the open space between the well casing and the walls of the drill hole is filled with cement or grout to prevent cave-ins. This also serves to prevent any movement of water vertically within the drill hole.

One of the most important pieces of information we get from sampling ground water in wells is simply the depth of the water table. As water enters the well through the well screen, it rises up into the well to a level related to the height of the water table. When water-level data for a number of different wells are evaluated, we can determine the *ground-water gradient*, the direction in which the ground water is flowing. This helps to determine where any contamination may have originally come from and where it may be flowing.

Ground Water SAMPLING

Water samples are also taken from each well and sent to a laboratory for detailed chemical analysis. The Environmental Protection Agency has outlined strict procedures for the taking, transporting, and analysis of these samples. In addition, there are also detailed procedures for

assuring the quality and reliability of the data obtained from each sample.

Multiport WELLS

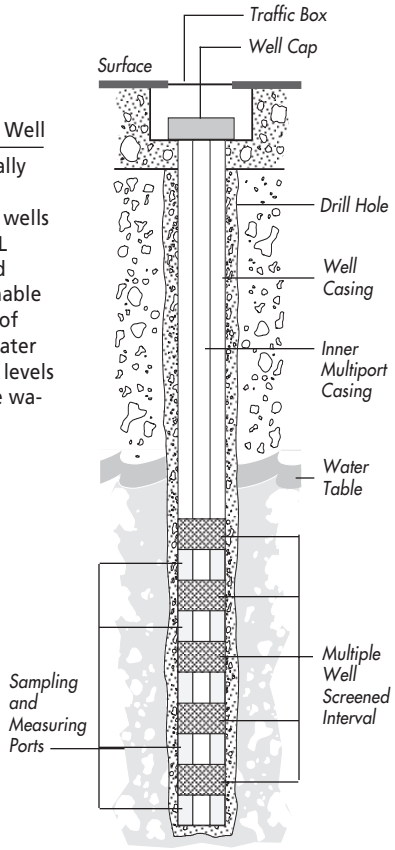
The ground-water monitoring wells installed for the JPL Superfund Project are of a special design that allows sampling at multiple levels below the water table. This is necessary because different types of contaminants behave in different ways. For example, some liquid contaminants float on water and therefore would be found on top of the water table. Other liquids are denser than water and sink downward through the ground water over time.

The special multiport wells used in the JPL project have up to five screened intervals, approximately evenly spaced from just below the top of the water table to the bottom of the well, near the bedrock. Each screened interval is isolated from the other by a specially designed inner casing fitted with both sampling ports and measuring ports for each screened interval. Sampling ports allow the collection of water samples; measuring ports are used to collect other information (e.g., temperature).

Sampling is done with a special tool that is lowered down the inner multiport casing. This tool connects to an individual port and allows pumping or sampling of only one screened interval at a time. This way, only water from that particular depth is sampled.

Each time one of the multiport wells is sampled, data is obtained from five different levels below the water table. This allows more precise definition of the vertical extent of contamination within the ground-water aquifer.

These detailed data will be used to develop an accurate, three-dimensional picture of ground water in and around JPL. In turn, this enhanced understanding of our ground water will be used to design appropriate ways to deal with ground-water contamination.



Multiport Well

The specially designed multiport wells for the JPL Superfund Project enable sampling of ground water at several levels below the water table.

Agency CONTACTS

The following local contacts represent agencies involved inthe Superfund process:

• Jon Bishop
L.A. Regional Water Quality Control Board (RWQCB)
101 Centre Plaza Drive
Monterey Park,
California 91754
(213) 266-7538

• Debbie Lowe
U.S. Environmental Protection Agency (EPA)
Region IX
75 Hawthorne Street, M/S H-9-1
San Francisco, California 94105
(415) 744-2206

• Penny Nakashima
California EPA, Department of Toxic Substances Control (DTSC)
1011 N. Grandview Avenue
Glendale, California 91201
(818) 551-2881

SUPERFUND INFORMATION

For information on the environmental cleanup effort at JPL, and for ideas on how you can become involved, please contact:

Public Services Office
Jet Propulsion Laboratory, 186-113
4800 Oak Grove Drive
Pasadena, California
91109-8099

Tel: (818) 354-0112

For copies of other documents related to the Superfund cleanup, check these local public information repositories:

Altadena Public Library
600 E. Mariposa St.
Altadena

La Cañada–Flintridge Public Library
4545 W. Oakwood Ave.
La Cañada–Flintridge

Pasadena Central Library
280 E. Walnut St.
Pasadena

National Aeronautics and Space Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL D-13036-3 8/96